

## CLAIMS:

1. A directory assistant method for providing desired directory entry information, comprising the steps of:

- (a) receiving a speech signal describing the desired directory entry;
- (b) recognizing the speech signal and generating recognized word sequences;
- 5 (c) interpreting the recognized word sequences by using a predetermined grammar rule and relevant information thereof stored in a database to form concept sequences;
- (d) interpreting the concept sequences according to semantic meaning and relevant information thereof stored in the database and current system status thereof, thereby generating at least one candidate for the desired directory entry;
- (e) looking up at least one directory entry information corresponding to the at least one candidate from the database; and
- 10 (f) outputting the at least one directory entry information located.

2. The method as claimed in Claim 1, further comprising the steps of user's correction or confirmation and repeating the steps (a) to (f) until the desired directory entry information is located.

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3. The method as claimed in Claim 1, wherein the step (a) further comprises the step of system prompting before receiving a speech signal.

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4. The method as claimed in Claim 1, wherein the predetermined grammar rule and concept sequences are used to describe the desired directory entry comprising entry name or at least one word of entry name and relevant information thereof.

5. The method as claimed in Claim 1, wherein the predetermined grammar rule is generated by frequently used grammar templates and frequently used words.
6. The method as claimed in Claim 5, wherein the grammar templates are 5 generated by one of frequently used nouns, names of famous people, idioms, character strokes, letters, words, and character roots.
7. The method as claimed in Claim 1, wherein the database comprises a relevant knowledge database and a directory database.

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8. The method as claimed in Claim 1, wherein the step (b) further comprises the step of expanding the recognized word sequences according to a confusion table.

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9. The method as claimed in Claim 8, wherein the confusion table is pre-trained and comprises all confusable words, their corresponding correct ones and occurring probabilities.

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20. The method as claimed in Claim 1, wherein the step (b) further comprises the step of confidence measurement for filtering out confusable word pairs according to a confidence table.

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11. The method as claimed in Claim 1, wherein the step (d) further comprises the step of updating the system status.

12. The method as claimed in Claim 1, wherein the step (e) further comprises the step of generating a question to request more information.

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13. The method as claimed in Claim 12, wherein the question is one of requesting a user to supply more information, listing-based confirmation and open-question confirmation.

14. The method as claimed in Claim 7, wherein the relevant knowledge database comprises words and using frequencies thereof, ways to describe the words, grammar rules, attributes and corresponding frequencies of usage.

5 15. The method as claimed in Claim 7, wherein the relevant knowledge database comprises communication concepts and frequencies of usage thereof, corresponding grammar rules, semantic meaning and frequencies of usage.

10 16. The method as claimed in Claim 7, wherein the directory database comprises a plurality of entries, wherein each entry comprises name, telephone number, relevant information and using frequency.

15 17. The method as claimed in Claim 1, wherein the at least one candidate is generated by using one of maximum a posterior probabilities and maximum likelihood criterion.

18. The method as claimed in Claim 1, wherein the method is a Mandarin directory assistant method.

20 19. A computer program product residing on a computer readable medium having a plurality of instructions stored thereon which, when executed by a processor, cause the processor to:

25 - receive a speech signal describing the desired directory entry;

- recognize the speech signal and generating recognized word sequences;

- interpret the recognized word sequences by using a predetermined grammar rule and relevant information thereof stored in a database to form concept sequences;

- interpret the concept sequences according to semantic meaning and relevant information thereof stored in the database and current system status thereof, thereby generating at least one candidate for the desired

directory entry;

look up at least one directory entry information corresponding to the at least one candidate from the database; and  
output the at least one directory entry information located.

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20. A directory assistant apparatus for providing desired directory entry information, comprising:

- a database for storing directory entry information, grammar rules and concept sequences;

10 - an acoustic recognition unit for receiving a speech signal describing the desired directory entry, recognizing the speech signal and generating recognized word sequences;

- a speech interpreting unit for interpreting the recognized word sequences by using a predetermined grammar rule and relevant information thereof

15 stored in the database to form concept sequences and interpreting the concept sequences according to semantic meaning and relevant information thereof stored in the database and current system status thereof, thereby generating at least one candidate for the desired directory entry;

20 - a look up unit for looking up at least one directory entry information corresponding to the at least one candidate from the database; and  
- an output unit for outputting the at least one directory entry information located.

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25 21. The directory assistant apparatus of Claim 20, wherein the predetermined grammar rule and concept sequences are used to describe the desired directory entry comprising entry name or at least one word of entry name and relevant information thereof.

30 22. The directory assistant apparatus of Claim 20, wherein the database comprises a relevant knowledge database and a directory database.

23. The directory assistant apparatus of Claim 22, wherein the relevant knowledge database comprises words and using frequencies thereof, ways to describe the words, grammar rules, attributes and corresponding using frequencies.

5 24. The directory assistant apparatus of Claim 22, wherein the relevant knowledge database comprises communication concepts and frequencies of usage thereof, corresponding grammar rules, semantic meaning and frequencies of usage.

10 25. The directory assistant apparatus of Claim 22, wherein the directory database comprises a plurality of entries, wherein each entry comprises name, telephone number, relevant information and frequencies of usage.

15 26. The directory assistant apparatus of Claim 20, wherein the predetermined grammar rule is generated by frequently used grammar templates and frequently used words.

20 27. The directory assistant apparatus of Claim 26, wherein the grammar templates are generated by one of frequently used nouns, names of famous people, idioms, character strokes, letters, words, and character roots.

28. The directory assistant apparatus of Claim 20, wherein the acoustic recognition unit further comprises a speech recognizer for recognizing the speech signal and generating recognized word sequences.

25 29. The directory assistant apparatus of Claim 20, wherein the acoustic recognition unit further comprises a confusion analyzer for expanding the recognized word sequences according to a confusion table.

30 30. The directory assistant apparatus of Claim 29, wherein the confusion table is pre-trained and comprises all confusable words, their corresponding correct ones and occurring probabilities.

31. The directory assistant apparatus of Claim 20, wherein the acoustic recognition unit further comprises a confidence measurement unit for filtering out confusable word pairs according to a confidence table.
- 5 32. The directory assistant apparatus of Claim 20, wherein the speech interpreting unit continuously updates the system status.
33. The directory assistant apparatus of Claim 20, further comprising a question generator for generating a question to request more information.
- 10 34. The directory assistant apparatus of Claim 33, wherein the question is one of requesting a user to supply more information, listing-based confirmation and open-question confirmation.
- 15 35. The directory assistant apparatus of Claim 20, wherein the at least one candidate is generated by using one of maximum a posterior probability and maximum likelihood criterion.
- 20 36. The directory assistant apparatus of Claim 20, wherein the outputting unit is a speech output unit.
37. The directory assistant apparatus of Claim 20, wherein the directory assistant apparatus is a Mandarin directory assistant apparatus.